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EXAMINER

LAWSON, MATTHEW P

ART UNIT	PAPER NUMBER
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2871

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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Office Action Summary

Application No.

10/516,951

Applicant(s)

HANDEREK ET AL.

Examiner

Matthew P. Lawson

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 December 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-36 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 17 and 19-21 is/are allowed.
- 6) ☒ Claim(s) 1-16 and 22-36 is/are rejected.
- 7) ☒ Claim(s) 18 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 December 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☒ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 6 Apr 04, 6 Dec 04
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application
- ☐ Other: _____

DETAILED ACTION

Status of the Application

1. **Claims 1-35** are pending in this application.

Priority

2. Acknowledgment is made of applicant's claim for foreign priority based on an application filed in the UK on 17 October 2003. It is noted, however, that applicant has not filed a certified copy of the Application No. 0324418.3 application as required by 35 U.S.C. 119(b).

Information Disclosure Statement

3. Information disclosure statements (IDS) were submitted on 6 April 2004 and 6 December 2004. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statements have been considered by the examiner.

Claim Objections

4. **Claim 18** is objected to because of the following informalities: The claim recites the limitation "the step of selecting a non-planar device..." Claim 16, from which this claim depends, fails to recite this step. Therefore, there is insufficient antecedent basis for this limitation in the claim. Proper antecedent basis appears to be found in claim 17.

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5. **Claim 28** is objected to because of the following informalities: The claim recites the limitation "said spacers." Claim 16, from which this claim depends, fails to recite this element. Therefore, there is insufficient antecedent basis for this limitation in the claim. Proper antecedent basis appears to be found in claim 17. Appropriate correction is required.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. **Claim 36** is rejected under 35 U.S.C. 102(b) as being anticipated by Meyerhofer, US Pat. No. 3,905,682.

8. Meyerhofer discloses a retroreflecting device comprising a lens having an outer surface (17) and a liquid crystal cell (20) having a layer comprising liquid crystal material, wherein the device includes a part arranged both to retroreflect a radiation beam passing through the lens and to function as an electrode of the liquid crystal cell (Figs. 2, 3; col. 3, lines 1-9).

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9. **Claims 1, 14, 16 and 33-35** are rejected under 35 U.S.C. 102(b) as being anticipated by Green et al. (Green), US Pat. No. 6,624,916 B1 (provided by applicant).

10. Regarding claims 1, 9 and 14, Green discloses, and shows in Fig. 14c, a retroreflective device comprising:

- a. a lens (195) having a non-planar, spherical, outer surface; and
- b. a liquid crystal cell (14) having a non-planar layer comprising liquid crystal material, said non-planar layer having a shape related to that of the non-planar outer surface of the lens and attached to said non-planar outer surface,
- c. wherein the device includes a reflective part (197) arranged to retroreflect a radiation beam passing through the lens, and the liquid crystal cell is arranged to modulate one or more characteristics of said retroreflected radiation beam (col. 12, line 55 - col. 13, line 2).

11. Regarding claim 5, Green further discloses a transparent electrode layer located on both sides of the liquid crystal layer (Green, col. 11, lines 31-36), i.e. between the lens and the liquid crystal material.

12. Regarding claim 16, the claimed method merely discloses the steps of providing a base, a lens, and a layer of liquid crystal, in order to form a retroreflective device. Since each of the claimed elements are necessary to form the device, the method would at least be anticipated by the device of Green, as discussed under claim 1 above.

13. Regarding claims 33-35, claim 1 is anticipated by Green as discussed above.

Green further discloses a retroreflective system including means configured to transmit data to a source of radiation incident upon the device by controlled application of said modulation, wherein:

- a. said data is transmitted over a free space communications link;
- b. the retroreflective device is arranged to emit signals in response to application of said modulation; and
- c. the system includes a phase modulation detector arranged to receive said emitted signals (col. 14, lines 17-29; col. 17, lines 13-63).

Claim Rejections - 35 USC § 103

16. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

17. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was

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not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

18. **Claims 2-4, 13 and 22** are rejected under 35 U.S.C. 103(a) as being unpatentable over Green in view of Meyerhofer.

19. Regarding claim 2, claim 1 is anticipated by Green as discussed above.

20. Green fails to expressly disclose the liquid crystal cell to comprise a metallic layer serving as both an electrode and a reflective part.

21. However, Meyerhofer discloses a retroreflective liquid crystal cell comprising a metallic layer serving as both an electrode and a reflective part (Meyerhofer, Figs. 2, 3; col. 3, lines 1-9).

22. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include a metallic layer serving as both an electrode and a reflective part, as taught by Meyerhofer, in the device of Green, in order to, for example, simplify the construction of the liquid crystal cell.

23. Regarding claim 3, claim 2 is unpatentable over Green in view of Meyerhofer as discussed above.

24. Green fails to expressly disclose an alignment layer locator between the reflective layer and the metallic layer.

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25. However, the examiner takes Official Notice that it would have been well known in the art at the time of the invention to include an alignment layer between the reflective metallic layer and the liquid crystal layer in a reflective liquid crystal cell.

26. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to in order to provide initial orientation to the liquid crystal molecules in the liquid crystal layer.

27. Regarding claim 4, claim 2 is unpatentable over the combination of Green and Meyerhofer as discussed above.

28. Green fails to expressly disclose the metallic layer to comprise aluminum.

29. However, Meyerhofer discloses the metallic retroreflective layer to comprise aluminum (Meyerhofer, col. 1, lines 57-62).

30. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have the metallic layer comprise aluminum in the device as taught by the combination of Green and Meyerhofer, since aluminum is a well-known reflective material, and it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of design choice. *In re Leshin*, 125 USPQ 146.

31. Regarding claim 13, claim 2 is unpatentable over the combination of Green and Meyerhofer as discussed above.

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32. Green further discloses an electrical source (drive signal generator 161) applying signals to the electrode layers in order to modulate an incident radiation beam (Green, col. 11, lines 27-46).

33. Regarding claim 22, claim 16 is anticipated by Green as discussed above.

34. Green fails to expressly disclose applying a metallized electrode layer to the base of the device.

35. However, Meyerhofer discloses a liquid crystal device wherein an aluminum electrode layer (i.e. a metallized electrode layer) is applied to the base of the device, as discussed under claims 2 and 4 above.

36. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply a metallized electrode layer, as taught by Meyerhofer, to the base of the device of Green, in order to, for example, simplify the construction of the liquid crystal cell.

37. **Claims 6 and 7** are rejected under 35 U.S.C. 103(a) as being unpatentable over Green in view of Nagano et al. (Nagano), US Pat. No. 5,223,964.

38. Claim 1 is anticipated by Green as discussed above.

39. Green fails to expressly disclose the liquid crystal layer to include spacers.

40. However, Nagano discloses ball-shaped spacers included in a liquid crystal layer (Nagano, Fig. 1, e.g.)

41. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include ball-shaped spacers in the liquid crystal layer of Green, in order to maintain a constant cell gap and prevent the formation of bubbles in the liquid crystal layer, as taught by Nagano (Nagano, col. 2, lines 32-38, e.g.).

42. **Claims 8, 31 and 32** are rejected under 35 U.S.C. 103(a) as being unpatentable over Green in view of Shinomiya et al. (Shinomiya), US Pat. No. 5,347,381.

43. Regarding claim 8, claim 1 is anticipated by Green as discussed above.

44. Green fails to disclose the use of ferroelectric liquid crystal.

45. However, Shinomiya discloses ferroelectric liquid crystal to have advantages such as memory and quick response times (Shinomiya, col. 2, lines 7-13, e.g.).

46. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use ferroelectric liquid crystal in the liquid crystal cell of Green, in order to, for example, increase the response time of the modulator, as taught by Shinomiya.

47. Regarding claims 31 and 32, claim 16 is anticipated by Green as discussed above.

48. Green fails to expressly disclose the liquid crystal volume to be heated and inserted under vacuum conditions into the device. Green also fails to expressly disclose a seal created between the base and the lens.

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49. However, Shinomiya discloses a liquid crystal cell including a volume of liquid crystal heated and inserted into a liquid crystal cell under a vacuum. Shinomiya further discloses a seal created in the liquid crystal cell (Shinomiya, col. 7, line 61 - col. 8, line 5, e.g.).

50. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have the liquid crystal volume be heated and inserted under vacuum conditions, and include a seal, as taught by Shinomiya, in the method of forming the device of Green, in order to, for example, evenly disperse and contain the liquid crystal volume in the cell.

51. **Claims 10-12 and 28** are rejected under 35 U.S.C. 103(a) as being unpatentable over Green in view of Courtney et al. (Courtney), US Pat. No. 4,066,335 (provided by applicant).

52. Regarding claim 10, claim 1 is anticipated by Green as discussed above. Green discloses the liquid crystal cell to be attached to the lens as discussed under claim 9 above.

53. Green fails to disclose the liquid crystal cell to be spaced apart from the lens.

54. However, Courtney discloses a lens system including a liquid crystal cell, wherein the liquid crystal cell is both attached to the lens (Courtney, Fig. 2) and spaced apart from the lens (Courtney, Fig. 3).

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55. Therefore, it would have been obvious as a matter of design choice to one of ordinary skill in the art at the time the invention was made to have the liquid crystal cell spaced apart from the lens, as taught by Courtney, in the device of Green, since Courtney teaches both configurations to be useful in the art, and it has been held that rearranging parts of an invention involves only routine skill in the art. *In re Japiske*, 86 USPQ 70.

56. Regarding claims 11 and 12, claim 10 is unpatentable over Green in view of Courtney as discussed above.

57. Green fails to expressly teach a transparent window having a shape related to that of the non-planar outer surface of the lens located between the liquid crystal cell and the lens, and fails to expressly disclose the transparent electrode layer to be supported by said window.

58. However, Courtney discloses, and shows in Fig. 2, a transparent window having a shape related to that of the non-planar outer surface of the lens located between the liquid crystal cell (13) and the lens, and the transparent electrode layer to be supported by said window. Specifically the "transparent window" as disclosed by Courtney can either be the lens (6) which has a shape related to that of lenses (5) and (4), or the transparent polarizer (14) which has a shape related to that of the lens (6). Courtney further discloses in Fig. 2 the transparent electrode layer (11) to be supported by the "transparent window" polarizer (14) or lens (6).

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59. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include a transparent window having a shape related to that of the non-planar outer surface of the lens located between the liquid crystal cell and the lens, and the transparent electrode layer to be supported by said window, as taught by Courtney, in the device of Green, in order to, for example, modulate light transmitted or reflected through the liquid crystal cell (Courtney, col. 2, line 55 – col. 3, line 11).

60. Regarding claim 28, claim 16 is anticipated by Green as discussed above.

61. Green fails to expressly teach the selecting of a transparent window having a shape related to that of the non-planar outer surface of the lens located between the liquid crystal cell and the lens, and the applying of the transparent electrode layer to the surface of said window.

62. However, Courtney teaches a transparent window having a shape related to that of the non-planar outer surface of the lens located between the liquid crystal cell and the lens, and the transparent electrode layer applied to said window, as discussed under claims 11 and 12 above.

63. The claimed method merely discloses the steps of selecting the non-planar and applying the transparent electrode layer. Since each of the claimed elements are necessary to form the device, the method would at least be obvious over the device of Green in view of Courtney.

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64. **Claim 15** is rejected under 35 U.S.C. 103(a) as being unpatentable over Green in view of Lindell, US Pat. No. 5,424,737 (provided by applicant).

65. Claim 1 is anticipated by Green as discussed above.

66. Green fails to disclose the lens to comprise a graded refractive index lens.

67. However, Lindell discloses a liquid crystal cell (14) in conjunction with a Luneberg lens (12), which is an example of a graded refractive index (GRIN) lens.

68. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include a GRIN lens, as taught by Lindell, in the retroreflective device comprising a liquid crystal cell of Green, in order to focus the incident light on the liquid crystal cell (Lindell, Fig. 2; col. 7, lines 17-32).

69. **Claims 23 and 24** are rejected under 35 U.S.C. 103(a) as being unpatentable over Green in view of Heynisch et al. (Heynisch), US Pat. No. 4,213,810.

70. Claim 16 is anticipated by Green as discussed above.

71. Green fails to expressly disclose applying an alignment layer to the base via sputtering and imprinting molecular-scale ridges into the alignment layer.

72. However, Heynisch discloses a method of forming a liquid crystal cell wherein the alignment layer is applied by sputtering and a plurality of grooves (i.e. molecular-scale ridges) are imprinted into the alignment layer, as is common in the art of liquid crystal fabrication (Heynisch, col. 1, ¶ 2; col. 2, lines 7-27). Specifically, the grooves are

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imprinted by either rubbing (Heynisch, col. 1, lines 35-40), photoexposure (Heynisch, col. 1, lines 44-49), or by application of ultrasonic waves (Heynisch, Abstract, etc.).

73. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply an alignment layer to the base via sputtering and imprint molecular-scale ridges into the alignment layer, as taught by Heynisch, in forming the device of Green, in order to provide initial orientation to the liquid crystal molecules in the liquid crystal layer.

74. **Claims 25 and 26** are rejected under 35 U.S.C. 103(a) as being unpatentable over Green in view of Heynisch, as applied to claim 23 above, and further in view of Saiuchi et al. (Saiuchi), US Pat. No. 5,486,941.

75. Claim 23 is unpatentable over Green in view of Heynisch as discussed above.

76. Green fails to disclose applying spacers onto an alignment film under control of a pressurized gas flow.

77. However, Saiuchi discloses a method of forming a liquid crystal cell wherein spacers are applied onto an alignment film under control of a pressurized gas flow (Saiuchi, Example 1, e.g.).

78. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to in order to distribute the spacers uniformly on the base (Saiuchi, col. 14, lines 1-6), the spacers being necessary to maintain a constant cell gap.

79. **Claim 27** is rejected under 35 U.S.C. 103(a) as being unpatentable over Green.

80. Claim 16 is anticipated by Green as discussed above.

81. Green further discloses the liquid crystal cell to comprise transparent electrodes, as discussed under claim 5 above.

82. Green fails to expressly disclose applying a transparent electrode to the surface of the lens.

83. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the transparent electrode to the lens surface, in view of the positions of the lens surface and transparent electrodes as disclosed by Green, since it has been held that rearranging parts of an invention involves only routine skill in the art. *In re Japiske*, 86 USPQ 70.

84. **Claims 29 and 30** are rejected under 35 U.S.C. 103(a) as being unpatentable over Green in view of Courtney, as applied to claim 28 above, and further in view of Nagano.

85. Regarding claim 29, claim 28 is unpatentable over Green in view of Courtney as discussed above.

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86. Green fails to expressly disclose locating the window onto the spacing devices, so that the surface supporting the transparent electrode layer is adjacent to said spacers.

87. However, Nagano discloses a liquid crystal cell comprising a transparent window (substrate 2) located on spacers so that the surface supporting the transparent electrode layer is adjacent to said spacers (Nagano, Fig. 1; col. 2, line 61 - col. 3, line 9).

88. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to locate the window onto spacing devices so that the surface supporting the transparent electrode layer is adjacent to said spacers, as taught by Nagano, in the method of forming the device of Green in view of Courtney, in order to, for example, maintain a constant cell gap in the liquid crystal cell.

89. Regarding claim 30, claim 29 is unpatentable over Green in view of Courtney and Nagano as discussed above.

90. Green fails to expressly teach locating the lens in relation to the window so that a gap exists between the liquid crystal cell and the lens.

91. However, Courtney discloses a lens system including a liquid crystal cell, wherein the liquid crystal cell is spaced apart from the lens via a gap, as discussed under claim 10 above.

92. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have a gap between the liquid crystal cell and the lens,

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as taught by Courtney, in the method of forming the device of Green in view of Courtney and Nagano, since it has been held that rearranging parts of an invention involves only routine skill in the art. *In re Japiske*, 86 USPQ 70.

Allowable Subject Matter

93. **Claims 17 and 19-21** are allowed.

94. The following is a statement of reasons for the indication of allowable subject matter: the prior art made of record fails to disclose or suggest the claimed method for forming a retroreflective device according to the present invention, said method comprising the steps of: inserting a non-planar device (i.e. spherical lens) into a viscous material (i.e. wax), applying a spacer layer to the exposed portion of said non-planar device, and covering said spacer layer spacer with a curable resin.

Cited Prior Art

95. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. For example:

- i. US Pat. No. 4,190,330 discloses a liquid crystal cell formed on a non-planar surface.

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Conclusion


96. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew P. Lawson whose telephone number is 571-272-9795. The examiner can normally be reached on Monday through Thursday from 8:00am to 6:00pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David C. Nelms, can be reached at 571-272-1787. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Matthew P. Lawson,
Examiner

MPL


ANDREW SCHECHTER
PRIMARY EXAMINER